Course guide
2400300 - 240MAU11 - Connected Vehicle I

Last modified: 29/05/2026

Unit in charge: Barcelona School of Industrial Engineering
Teaching unit: 744 - ENTEL - Department of Network Engineering.

Degree: MASTER'S DEGREE IN AUTOMOTIVE ENGINEERING (Syllabus 2026). (Compulsory subject).

Academic year: 2026 **ECTS Credits:** 5.0 **Languages:** Spanish

LECTURER

Coordinating lecturer: De La Cruz Llopis, Luis Javier

Others:

TEACHING METHODOLOGY

Lectures
Application classes
Laboratory classes
Laboratory sessions
Individual work (not presential)
Group work (not presential)
Short-answer tests (Control)
Short-answer tests (Test)
Extended-response tests (Final Exam)

LEARNING OBJECTIVES OF THE SUBJECT

This subject aims to provide participants with a basic understanding of the various communication infrastructures and systems used by vehicles, both for internal communication within their own electronic systems and for external communication with other vehicles or other devices on the road. To achieve this, lectures are combined with several practical laboratory sessions.
The course begins with the most fundamental concepts of transmission systems and communication networks, eventually providing a comprehensive overview of the most commonly used protocol hierarchy.

STUDY LOAD

Type	Hours	Percentage
Hours large group	30,0	24.00
Hours small group	15,0	12.00
Self study	80,0	64.00

Total learning time: 125 h

CONTENTS

Lesson 1. Basic concepts.

Description:
Channels and nodes in communication networks.
Multiplexing of transmission channels.
Network topologies.
Switching modes.
Protocol architectures.

Full-or-part-time: 6h
Theory classes: 6h

Lesson 2. Data link.

Description:
Flow control and error control.
Medium access control techniques.
Vehicle internal communication buses (CAN).
Local area networks (Ethernet, Automotive Ethernet, WiFi).

Full-or-part-time: 16h
Theory classes: 10h
Laboratory classes: 6h

Lesson 3. TCP / IP protocol architecture.

Description:
Basic network protocols (IP, ARP, ICMP).
Transport protocols (UDP, TCP).
Application protocols (DHCP, DNS, HTTP, MQTT).
Cybersecurity.

Full-or-part-time: 23h
Theory classes: 14h
Laboratory classes: 9h

GRADING SYSTEM

- This subject has theory (65%) and laboratory (35%) evaluation.
- The theory mark consists of a midterm control (40% of the theory mark) and a final exam (60% of the theory mark).
- The laboratory mark consists of a midterm control (40% of the laboratory mark) and a final exam (60% of the laboratory mark).
- To pass the subject, the attendance to laboratory class must be 100%, except cases justified in writing.

Addendum: In case the health situation during the course by COVID-19 requires it, the method and the assessment tests will be suitably modified so that they can be carried out in a non-face-to-face mode.

BIBLIOGRAPHY

Basic:
- Forouzan, Behrouz A. Data communications and networking with TCP/IP protocol suite . Sixth edition. New York : Mc Graw-Hill, [2022]. ISBN 1260597822.